WHAT IS CLAIMED IS:

1. A method for manufacturing a semiconductor device comprising a metal oxide formed on a semiconductor substrate using a chemical vapor deposition method, said method comprising:

a dual-stage deposition step comprising a first stage for introducing a material gas containing a specified metal into a reactor in which said semiconductor substrate is placed and a second stage for subsequently introducing an oxidizing gas into said reactor, and

wherein said metal oxide film as an oxide of said specified metal is formed on said semiconductor substrate, by repeating said dual-stage deposition step two or more times.

2. The method for manufacturing the semiconductor device according to claim 1, wherein introduction of said material gas is stopped at said second stage.

3. The method for manufacturing the semiconductor device according to claim 1, wherein said oxidizing gas to be introduced at said first stage is less than the flow rate of said oxidizing gas to be introduced at said second stage.

4. The method for manufacturing the semiconductor device according to claim 1, wherein said material gas contains oxygen, whereby said specified metal is oxidized, even by only said material gas.

5. The method for manufacturing the semiconductor device

according to claim 1, wherein said dual-stage deposition step is repeated two to ten times.

6. The method for manufacturing the semiconductor device according to claim 1, wherein in the repetition of said dual-stage deposition step, said oxidizing gas is introduced as a preliminary step before the primary dual-stage deposition step is started.

7. The method for manufacturing the semiconductor device according to claim 1, wherein in the repetition of said dual-stage deposition step, said second stage in the final dual-stage deposition step is omitted.

8. The method for manufacturing the semiconductor device according to claim 1, wherein tantalum, hafnium, or zirconium is used as said specified metal.

9. The method for manufacturing the semiconductor device according to claim 8, wherein when using said tantalum as said specified metal, tantalum penta-ethoxide is used as said material gas.

10. The method for manufacturing the semiconductor device according to claim 1, wherein as said oxidizing gas, such a gas is used as to contain oxygen, ozone, water, nitrogen oxide, or an oxygen radical.

11. The method for manufacturing the semiconductor device

according to claim 1, wherein duration of said first stage or said second stage is set to be longer than a mean residence time, in said reactor, of said material gas introduced at said first stage or said oxidizing gas introduced at said second stage respectively.

12. A method for manufacturing a semiconductor device comprising a capacitor having a lower electrode, an upper electrode and a capacitive insulating film between said lower electrode and said upper electrode on a semiconductor substrate, wherein said capacitive insulating film is formed on said lower electrode over said semiconductor substrate using a chemical vapor deposition method, said method comprising:

a lower electrode forming step of forming said lower electrode on said semiconductor,

a dual-stage deposition step comprising a first stage for introducing a material gas containing a specified metal into a reactor in which said semiconductor substrate is placed and a second stage for subsequently introducing an oxidizing gas into said reactor, and

wherein a metal oxide film as an oxide of said specified metal is formed on said lower electrode over said semiconductor substrate, by repeating said dual-stage deposition step two or more times, hereby forming said capacitive insulating film; and

an upper electrode forming step of forming said upper electrode on said capacitive insulating film.

13. The method for manufacturing the semiconductor device according to claim 12, wherein introduction of said material gas

is stopped at said second stage.

14. The method for manufacturing the semiconductor device according to claim 12, wherein said oxidizing gas to be introduced at said first stage is less than the flow rate of said oxidizing gas to be introduced at said second stage.

15. The method for manufacturing the semiconductor device according to claim 12, wherein said material gas contains oxygen, whereby said specified metal is oxidized, even by only said material gas.

16. The method for manufacturing the semiconductor device according to claim 12, wherein said dual-stage deposition step is repeated two to ten times.

17. The method for manufacturing the semiconductor device according to claim 12, wherein in the repetition of said dual-stage deposition step, said oxidizing gas is introduced as a preliminary step before the primary dual-stage deposition step is started.

18. The method for manufacturing the semiconductor device according to claim 12, wherein in the repetition of said dual-stage deposition step, said second stage in the final dual-stage deposition step is omitted.

19. The method for manufacturing the semiconductor device according to claim 12, wherein tantalum, hafnium, or zirconium

is used as said specified metal.

20. The method for manufacturing the semiconductor device according to claim 19, wherein when using said tantalum as said specified metal, tantalum penta-ethoxide is used as said material gas.

21. The method for manufacturing the semiconductor device according to claim 12, wherein as said oxidizing gas, such a gas is used as to contain oxygen, ozone, water, nitrogen oxide, or an oxygen radical.

22. The method for manufacturing the semiconductor device according to claim12, wherein duration of said first stage or said second stage is set to be longer than a mean residence time, in said reactor, of said material gas introduced at said first stage or said oxidizing gas introduced at said second stage respectively.

23. The method for manufacturing the semiconductor device according to claim 12, wherein a surface shape of said lower electrode of said capacitor is formed as a three-dimensional structure.

24. The method for manufacturing the semiconductor device according to claim 23, wherein said surface shape of said lower electrode is formed as a hemispherical silicon grain.

25. A method for manufacturing a semiconductor device

comprising a metal oxide formed on a semiconductor substrate using a chemical vapor deposition method, said method comprising:

a dual-stage deposition step comprising a first stage for introducing a material gas containing a specified metal into a reactor, in which said semiconductor substrate is placed, to form said metal oxide film as an oxide of said specified metal on said semiconductor substrate, and a second stage for decreasing a flow rate of said material gas so as to be below the flow rate thereof at said first stage and introducing an oxidizing gas into said reactor to expose a surface of said metal oxide film to said oxidizing gas, and

wherein said metal oxide film having a desired thickness is formed on said semiconductor substrate, by repeating said dual-stage deposition step two or more times.

26. The method for manufacturing the semiconductor device according to claim 25, wherein introduction of said material gas is stopped at said second stage.

27. The method for manufacturing the semiconductor device according to claim 25, wherein said oxidizing gas to be introduced at said first stage is less than the flow rate of said oxidizing gas to be introduced at said second stage.

28. The method for manufacturing the semiconductor device according to claim 25, wherein said material gas contains oxygen, whereby said specified metal is oxidized, even by only said material gas.

29. The method for manufacturing the semiconductor device according to claim 25, wherein said dual-stage deposition step is repeated two to ten times.

30. The method for manufacturing the semiconductor device according to claim 25, wherein in the repetition of said dual-stage deposition step, said oxidizing gas is introduced as a preliminary step before the primary dual-stage deposition step is started.

31. The method for manufacturing the semiconductor device according to claim 25, wherein in the repetition of said dual-stage deposition step, said second stage in the final dual-stage deposition step is omitted.

32. The method for manufacturing the semiconductor device according to claim 25, wherein tantalum, hafnium, or zirconium is used as said specified metal.

33. The method for manufacturing the semiconductor device according to claim 32, wherein when using said tantalum as said specified metal, tantalum penta-ethoxide is used as said material gas.

34. The method for manufacturing the semiconductor device according to claim 25, wherein as said oxidizing gas, such a gas is used as to contain oxygen, ozone, water, nitrogen oxide, or an oxygen radical.

35. The method for manufacturing the semiconductor device according to claim 26, wherein duration of said first stage or said second stage is set to be longer than a mean residence time, in said reactor, of said material gas introduced at said first stage or said oxidizing gas introduced at said second stage respectively.